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**Banning tobacco price promotions, smoking-related beliefs and behavior: Findings from
the International Tobacco Control Four Country (ITC 4C) Survey**

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ABSTRACT

Background: Ecological models emphasize multi-level influences on health behaviors. While studies show that exposure to price promotions is associated with smoking behavior and its antecedents, less is known about whether these associations differ by macro-level factors such as national price-promotion policies.

Methods: Current and former smokers ($N=4,698$) from the International Tobacco Control Policy Evaluation Project four-country cohort were included in weighted multivariate logistic regression models to examine individual-level associations between exposure to price promotions at Waves 7 and 8 (conducted in 2008-2009 and 2010-2011) and beliefs (social and injunctive norms, functional value of smoking, misconceptions around smoking, and beliefs of tobacco industry and its regulations) and behavior at Wave 8, stratified by whether countries allow (Australia, United States) or ban (Canada, United Kingdom) price promotions.

Results: Associations between exposure to price promotions and smoking-related beliefs and behavior differed by national price-promotion policies. In countries that allow price promotions, participants repeatedly exposed to price promotions at Waves 7 and 8 were more likely to associate functional values to smoking (i.e., calms down when stressed, AOR 1.83) and to be current smokers at Wave 8 (AOR 1.94). In countries that ban price promotions, participants repeatedly exposed to price promotions were less likely to hold misconceptions around smoking (i.e., harsher smoke is more dangerous).

Conclusions: Differential associations emerged between exposure to price promotions, smoking-related beliefs, and behavior across countries with and without a price-promotions ban. Adopting price-promotion bans could ameliorate the associations between exposure to price promotions and smoking beliefs and behaviors.

What this paper adds:

- We examined the impact of national-level price promotion bans on the association between exposure to price promotions and smoking-related beliefs and behavior.
- This study showed prospective associations between exposure to price promotions and pro-smoking beliefs related to the functional value of smoking and smoking behavior. These associations were observed only in countries without bans on price promotions.
- The findings are consistent with calls for a comprehensive ban on price promotions as a component of broader tobacco-control policies as outlined in the World Health Organization's Framework Convention on Tobacco Control.

INTRODUCTION

Cigarette prices are associated with smoking behavior among youth and adults.^{1,2} Estimates show that a 10% permanent increase in cigarette prices is associated with 4% short-term and 7.5% long-term reductions in demand for cigarettes.³ Governments affect price through taxation and non-taxation strategies (e.g., minimum cigarette prices) to curb smoking initiation among non-smokers, and reduce consumption and encourage quit attempts among current smokers. These strategies are particularly effective with price-sensitive populations such as youth, minorities, and low-income individuals.⁴⁻⁸

Tobacco companies, conversely, use price-based strategies to incentivize initiation among experimenters and those susceptible to smoking, and to reward current smokers for repeated purchases.⁴ Price promotions – also known as promotional discounting – reduce the cost of cigarettes where tobacco companies offer retailers and wholesalers discounts (e.g., volume discounts, value-added services) to boost sales.⁹ Consumers can acquire these discounts through direct mail, email/websites/mobile phones, and point-of-sale.^{10,11} Repeated receipt of coupons tailored to consumers' needs and socioeconomic levels leads to brand loyalty and long-term relationships between tobacco companies and their customers.¹² More importantly, price promotions (e.g., buy-one-get-one free, price discounting coupons) can undermine price-based tobacco control policies that have been at the forefront of smoking prevention and cessation efforts.¹³⁻¹⁸ Further, they compensate for increasing bans on cigarette advertising in mass media.^{4,19,20} Retail and wholesale price promotions accounted for \$7.6 billion (85.4%) of tobacco companies' expenditures (\$8.9 billion) in the U.S. in 2013.²¹

The World Health Organization (WHO) enacted a Framework Convention on Tobacco Control (FCTC) in 2003.²² To implement provisions related to tobacco advertising, promotion,

and sponsorship in Article 13 of FCTC, WHO introduced six tobacco-control strategies, abbreviated as MPOWER, to limit both demand and supply arms of tobacco use. One of these strategies focuses on enforcing advertising, promotional, and sponsorship bans,^{23,24} which remains the least adopted MPOWER strategy. Only 24 countries (covering 10% of the world's population, roughly 694 million) have a complete ban on advertising, promotions, and sponsorship. Further, 84 countries (49% of the world's population) have bans on price promotions.²³

Ecological models emphasize the influence of concentric intrapersonal, interpersonal, organizational, community, and public policy factors and their interaction on health behavior.^{22,25,26} Past research examined the characteristics of price promotions' recipients,²⁷ and established a causal link between tobacco promotions and consumption^{28,29} and an association between bans on advertising, promotions, and sponsorship and low awareness of pro-tobacco marketing and consumption.³⁰⁻³² However, the influence of policy-level regulations on the association between exposure to price promotions and smoking-related beliefs and behavior has not been fully examined. Policy regulations reach entire populations and become the setting where intrapersonal-level variables operate.²⁶ The purpose of this study is to examine whether the associations between exposure to tobacco price promotions and smoking-related beliefs and behavior differ by whether countries ban (Canada [CA], United Kingdom [UK]) or allow (Australia [AU], United States [US]) price promotions.³³

Price promotions are banned under the Tobacco Act of 1997 in CA³⁴ and the Tobacco Advertising and Promotion Act of 2002 in UK.³⁵ Specifically, in CA, 1997, c. 13, c. 25; 1998, c. 38. S. 2 prohibits sales promotions where manufacturers and retailers are not to "offer or provide any consideration, direct or indirect, for the purchase of a tobacco product, including a gift to a

purchase or a third party, bonus, premium, cash rebate or right to participate in a game, lottery or contest.”³⁴ In UK, 2002c. 36, Section 9 prohibits free distributions of “(a) any product or coupon away to the public in the United Kingdom or (b) causes or permits that to happen ... to promote a tobacco product.”³⁶ Conversely, price promotions are allowed under the Tobacco Advertising prohibition Act of 1992 in AU³⁷ and the Master Settlement Agreement of 1998 in US.³⁸

We extend previous literature on tobacco price promotions in three ways. First, whereas previous studies focused on examining individual-level smoking beliefs and behaviors, we use a quasi-experimental design to examine the influence of national price-promotions policies on the associations between exposure to price promotions and smoking beliefs and behavior. This design overcomes methodological challenges of ecological models where it is difficult to experimentally manipulate factors at multiple levels. Second, we examine a multitude of smoking-related beliefs around social and injunctive norms, perceived functional value of smoking, misconceptions around smoking, and beliefs of tobacco industry and its regulations. Previous studies showed that smokers have misconceptions around smoking (e.g., reduced risks of light vs. regular cigarettes)³⁹⁻⁴¹ and associate functional values to smoking.⁴² Other studies showed associations between tobacco-control policies (e.g., clean air) and norms around smoking and support for regulating the tobacco industry.^{43,44} However, few studies explored the associations between exposure to price promotions and psychosocial antecedents of smoking behavior (e.g., social benefits of smoking).^{45,46} Third, we examine repeated exposure to price promotions, which has not been examined despite evidence of a dose-response relationship between exposure to both pro-⁴⁷ and anti-tobacco messages⁴⁸ and beliefs and attitudes.

METHODS

We used data from the International Tobacco Control Four-Country Survey (ITC 4C), an international cohort study of adult smokers in CA, UK, AU, and US. ITC's longitudinal, quasi-experimental design affords the potential to examine psychological and behavioral outcomes of national tobacco control policies over time. Each ITC 4C wave consists of approximately 2000 adult smokers per country (≥ 18 years old who smoked 100 cigarettes in their lifetime with ≥ 1 smoking incident in the past 30 days) who are recruited using probability sampling procedures. Within each country, geographic regions are stratified and eligible households are randomly selected using random-digit dialing of landlines to ensure proportional representation of population size within each stratum. Within each eligible household, one respondent is selected using the next birthday method. After recruitment, smokers who quit are retained for comparison with smokers and discovery of relapses and transition to alternative tobacco types. Each wave is replenished with new recruits to account for attrition using the same sampling procedures. Age and gender were used to generate weights for samples from all four countries. Additionally, ethnicity was used in weighing US sample. Participants complete surveys in English or French using assisted telephone interviews or on the web. Complete information on the ITC Project is available elsewhere.^{49,50}

We used data from Waves 7 (conducted in 2008-2009) and 8 (conducted in 2010-2011), the most recent ITC 4C waves after CA and UK enacted price-promotion bans and data were collected simultaneously across all four countries. Analyses were limited to participants who completed both Waves 7 and 8 surveys ($N = 4,698$). In AU, we included only 855 participants whose Wave 8 data were collected before state-level point-of-sale signage against price promotions in the Australian Capital Territory, New South Wales, and Western Australia despite a no-ban national status. Advertising and promotions at point-of-sale are under the jurisdiction of

the States and Territories in AU. Participants surveyed after state-level laws became effective ($n = 437$) were less likely to be exposed to price promotions at both Waves 7 and 8 (AOR 0.19, 95% CI 0.08 – 0.43) compared to participants surveyed before the law signage.

Participants were current and former smokers at Wave 7. Former smokers at Wave 7 ($n = 390$) were retained because previous studies show that only 3-5% achieve long-term abstinence.⁵¹ Although current smokers at Wave 7 (AOR 2.28, 95% CI 1.27 – 4.09) and 8 (AOR 1.64, 95% CI 1.09 – 2.46) were more likely to be repeatedly exposed to price promotions at Waves 7 and 8 compared to former smokers, no significant differences were detected between current and former smokers at Wave 7 (AOR 1.07, 95% CI 0.67 – 1.73) and 8 (AOR 1.30, 95% CI 0.93 – 1.82) in single exposure to price promotions at either Wave 7 or 8. In countries that ban price promotions (CA, UK), no significant differences were detected between current and former smokers in repeated and single exposure to price promotions ($ps > 0.05$).

Attrition analyses showed no significant differences between participants who completed Wave 8 and those who did not ($n = 2071$) based on gender, education, survey mode at Wave 7, smoking status at recruitment and at Wave 7, and exposure to price promotions at Wave 7 ($ps > 0.05$). Significant differences were detected based on age, ethnicity, income, marital status, and recruitment wave ($ps < 0.05$).

Measures

Exposure to price promotions was assessed at Wave 7 and 8 using a yes/no item, “In the last 6 months, have you noticed special price offers for cigarettes?” We categorized exposure to price promotions into: repeated (i.e., exposure at Waves 7 and 8), single (i.e., exposure at either Wave 7 or 8), and no (i.e., no exposure at Waves 7 and 8) exposure.

Smoking beliefs were dichotomized into yes/no where “strongly agree” and “agree” responses were coded “yes” and “neither agree nor disagree,” “disagree,” and “strongly disagree” responses were coded “no.” This scheme follows previous research⁵² where only affirmative responses counted as dismissing or acknowledging smoking-related beliefs. Two statements gauged social and injunctive norms (i.e., “Society disapproves of smoking,” “People who are important to you believe that you should not smoke”). Three statements gauged perceived functional value of smoking (i.e., “Smoking calms you down when you are stressed or upset,” “Smoking is an important part of your life,” “You enjoy smoking”). Two statements gauged misconceptions around smoking (i.e., “If a cigarette tastes lighter, it means you get less tar,” “The harsher the smoke feels in your throat, the more dangerous the smoke is likely to be”).

Five statements gauged beliefs of the tobacco industry and its regulations (i.e., “Tobacco companies sometimes provide information about how to quit smoking. Do you think they are sincere in their efforts to improve the health of their customers?” “Tobacco products should be more tightly regulated,” “Tobacco companies should not be allowed to promote cigarettes at all, but merely make them available to adults who want to smoke them,” “Tobacco companies should be required to sell cigarettes in plain packages – that is, in packs without any brand names or fancy designs,” “Do you support or oppose the government suing tobacco companies to recover health care costs caused by tobacco use?”). The first four items were measured using a five-point Likert scale. “Strongly agree” and “agree” responses were coded “yes,” whereas “neither agree nor disagree,” “disagree,” and “strongly disagree” responses were coded “no.” The last policy-related item was a four-point Likert scale where “strongly support” and “support” responses were coded “yes” and “oppose” and “strongly oppose” responses were coded “no.”

Smoking behavior was coded into current (daily smokers, weekly smokers, monthly smokers) and former (i.e., those who quit in the last month, quit 1-6 months ago, quit > 6 months ago) smokers. Data on gender, age, ethnicity, income, education, and marital status were collected.

Analyses

Using SAS® version 9.3,⁵³ we conducted weighted multinomial regression to test variations in exposure to price promotions by country. CA served as a reference group because its participants had the lowest exposure to price promotions at Wave 7 and/or Wave 8 of the two countries that ban price promotions. We used weighted multivariate logistic regression models to examine individual-level prospective associations of repeated (at Waves 7 and 8) and single (at Wave 7 or 8) exposure to price promotions in the past 6 months on smoking-related beliefs and behavior at Wave 8 stratified by whether countries ban (CA, UK) or allow (AU, US) price promotions adjusting for age, gender, ethnicity, income, education, marital status, survey mode at Waves 7 and 8, wave of recruitment, smoking status at Wave 7, and belief at Wave 7.

RESULTS

Self-reported exposure to price promotions

Sample characteristics appear in Table 1. Multinomial logistic regression showed that self-reported exposure to price promotions differed by country (Table 2). Relative to participants in CA, those in UK were more likely to report being exposed to price promotions at both Waves 7 and 8 than not being exposed to any price promotions (AOR 1.94, 95% CI 1.37 – 2.75). Participants in US were more likely to report being exposed to price promotions at both Waves 7 and 8 (AOR 41.14, 95% CI 28.23 – 59.96) and at either Wave 7 or 8 (AOR 7.26, 95% CI 5.23 –

10.09). Conversely, participants in AU were less likely to report being exposed to price promotions at either Wave 7 or 8 (AOR 0.69, 95% CI 0.51 – 0.95).

Associations between self-reported exposure to price promotions and smoking beliefs and behaviors

Associations between exposure to price promotions and smoking-related beliefs and behavior for individual countries appear in Table 3 and by ban/ no-ban status appear in Table 4. In countries without bans on price promotions (i.e., AU and US), participants exposed to price promotions at both Waves 7 and 8 were more likely than those who reported no exposure to agree that people thought that they should not smoke (AOR 1.71, 95% CI 1.03 – 2.83) and that smoking calmed them down when stressed (AOR 1.83, 95% CI 1.16 – 2.89). Those exposed to price offers at either Wave 7 or 8 were more likely to agree that smoking was an important part of their lives (AOR 1.47, 95% CI 1.03 – 2.09). Exposure to price promotions at both Waves 7 and 8 was associated with being a current smoker at Wave 8 (AOR 1.94, 95% CI 1.12 – 3.39) (Table 4).

In countries with bans on price promotions (i.e., CA and UK), participants exposed to price offers at Waves 7 and 8 were less likely to hold misconceptions around smoking. They were less likely to believe that lighter taste meant less tar (AOR 0.64, 95% CI 0.42 – 0.97) and that harsher smoke was more dangerous (AOR 0.65, 95% CI 0.45 – 0.95). Participants who were exposed to price promotions at either Wave 7 or 8 were more likely to support not allowing tobacco companies to promote cigarettes (AOR 1.61, 95% CI 1.11 – 2.34). Exposure to price promotions was not associated with smoking behavior in countries with bans on price promotions ($p > 0.05$) (Table 4).

DISCUSSION

Price promotions are powerful marketing tools in tobacco companies' arsenal to promote smoking.⁴ Current and former smokers in CA, UK, AU, and US were exposed to price promotions. One potential reason for variations in self-reported exposure to price promotions within and across price-promotion policies is between-country variations in legislative extent and compliance with tobacco-control measures.^{54,55}

Associations between exposure to price promotions and smoking-related beliefs differed by price-promotions policies. Exposure to price promotions in AU and US was associated with pro-tobacco beliefs related to the functional value of smoking. These associations were not observed in CA and UK. Further, exposure to price promotions was associated with anti-tobacco beliefs, particularly lower misconceptions around smoking and an endorsement for banning the tobacco industry from promoting cigarettes in countries that ban price promotions. These findings align with ecological models of behaviors,²⁶ which emphasize the impact of policy- and social-level factors on individual-level psychological and behavioral variables and their interactions.^{32,56,57}

Smokers exhibit anti-smoking beliefs and support tobacco regulations progressively over time when such regulations exist.^{55,58} This might explain the non-intuitive association between exposure to price promotions and anti-smoking beliefs in countries that ban price promotions. Research is needed to examine the synergic impact of simultaneous factors that can reinforce (e.g., anti-tobacco campaigns) or undermine (e.g., tobacco marketing and promotional activities) national tobacco-control policies.⁵⁹ Anti-smoking efforts should focus on beliefs that were significantly associated with exposure to price promotions in our study: smoking-related myths, which sustain smoking and discourage cessation;³⁹⁻⁴¹ tobacco industry techniques;⁶⁰ and perceived social unacceptability of smoking, which is a protective factor against smoking based

on theories that emphasize the importance of normative belief⁶¹ and is associated with increased exposure to anti-tobacco messaging, increased intentions to quit, and long-term abstinence.⁴³

Exposure to price promotions was associated with smoking behavior only in countries that allow price promotions. From an economic standpoint, smokers acknowledge the financial burdens of smoking.⁶² A US regional study showed that 80% of adults who receive price promotion redeem them, which allows them to continue smoking.⁴⁵ We did not examine coupon redemption, which might explain the (non)significant association between exposure to price promotions and smoking behavior in countries that (ban)allow price-promotions.⁴⁵ Research is needed to identify factors that mediate the relationship between exposure to price promotions and smoking behavior (e.g., price paid per cigarette).

Repetition is a staple of tobacco industry advertising practices.⁶³ Repeated exposure to price promotions, defined as exposure at both Waves 7 and 8, was associated with smoking-related beliefs and behaviors in countries that allow price promotions with the exception of importance of smoking in life that was associated with single exposure to price promotions. Based on cognitive psychology literature, repeated exposure to price promotions makes smoking salient, which affects expressed beliefs and behaviors.^{64,65} Further, price promotions represent naturally occurring smoking cues in one's social environment that can trigger cravings⁶⁶ and activate smoking goals and behaviors.⁶⁷ Research should further explore the impact of national price-promotion policy on the amount and venues of exposure to price promotions and their associations with smoking beliefs and behavior.

Policy implications

Price promotions undermine general and price-based tobacco-control policies. In countries with no promotional bans, tobacco companies redirect their budgets to circumvent

advertising and sponsorship bans^{13,68} and cushion the effects of price-based tobacco-control policies. A US study showed that 86.5% of tobacco companies' direct mail contained coupons that offered an average of \$4.17 price reductions.⁶⁹ Redeeming price promotions represents one of several price-minimizing behaviors that consumers, especially from low socioeconomic statuses, engage in to control their expenditures when confronted with a price increase.⁷⁰⁻⁷² These price-minimizing behaviors are detrimental to smoking cessation.⁷³

A comprehensive ban on price promotions as a component of broader tobacco-control policies should be implemented as recommended by the WHO.^{23,74} Such national policies could dampen exposure to price promotions and create an anti-smoking environment. Finally, increasing awareness of and enforcing current/proposed bans remain important factors to achieve high compliance.^{23,54,60}

Strengths and limitations

We relied on representative samples of current and former smokers to examine associations between exposure to price promotions and smoking-related beliefs and behavior. The quasi-experimental design of ITC 4C allowed us to examine these associations in countries with national policies prohibiting or allowing tobacco price promotions. Although country-level analyses did not reveal meaningful results (Table 3), stratifying countries based on ban/no-ban status allowed for significant associations to emerge based on repeated vs. single exposure to price promotions and smoking-related beliefs and behaviors. Second, in addition to smoking behaviors, we examined smoking-related beliefs, which are important cognitive antecedents to smoking behaviors per theoretical frameworks such as the Theory of Reasoned Action.⁷⁵ Further, we examined different smoking-related beliefs, whereas other studies focused on one type such

as industry and tobacco policy related beliefs.⁴⁵ The ITC longitudinal design allowed us to examine exposure to price promotions on smoking-related beliefs and behaviors over time.

The study has several limitations. Emphasis on context in ecological models, while considered a strength, is methodologically challenging because it is difficult to disentangle and isolate complex multi-level interactions on health behaviors.²⁶ Accordingly, associations between exposure to price offers and smoking-related beliefs and behavior could be attributed to several factors other than price-promotions bans such as enactment and enforcement of tobacco control measures that vary within and by country over time.⁷⁶ For example, despite the ban on price promotions in UK, tobacco companies are engaging in alternative price-promotion strategies such as cheaper price-marked packs at launch and bolded price in point-of-sale advertising. AU has complete bans on advertising and sponsorship, high tobacco tax, and cigarette pack warning labels among other tobacco control measures.^{77,78} This might explain our results that showed that compared to CA, participants in AU were less likely to be exposed to price promotions despite a national ban on price promotions in CA and a no-ban in AU. Additionally, cultural differences between countries could affect the associations between exposure to price promotions and smoking-related beliefs and behavior even among the four countries examined here that are comparable on basic indicators (e.g., literacy rate).⁷⁹ However, sensitivity analyses showed no significant country by exposure interactions on smoking-related beliefs and behavior (Table 3). Finally, two tobacco-control policies were introduced during data collection period (i.e., UK graphic warning labeling in 2008⁸⁰ and US federal tax increase in 2009)⁸¹ that could have affected the results.

Results were based on self-reported exposure to price promotions, which are subject to recall error and misinterpretations. For example, participants in UK could have mistaken bolded

price in point-of-sale advertising for price promotions. Explicit measures of smoking-related beliefs are subject to social desirability biases and measurement limitations.⁸² We lack information on venues of exposure to price promotions especially in countries that ban price promotions. Finally, samples were not adjusted by ethnicity for CA, UK, and AU and were based on random-digit-dialing of landlines only.

Conclusion

Associations between exposure to price promotions and smoking-related beliefs and behavior differed by national policies on price promotions. Repeated exposure to price promotions was associated with favorable smoking beliefs and behavior only in countries without bans on price promotions. These results suggest that adopting a price-promotions ban with adequate enforcement, as recommended by the WHO FCTC, could mitigate the effect of price promotions on smoking beliefs and behavior.

Table 1. Weighted Sample characteristics.

	Canada (<i>n</i> = 1374)	United Kingdom (<i>n</i> = 1325)	Australia (<i>n</i> = 855)	United States (<i>n</i> = 1144)
	% (95% CI: LL - UL)	% (95% CI: LL - UL)	% (95% CI: LL - UL)	% (95% CI: LL - UL)
Gender				
Male	53.63 (50.33 – 56.92)	50.98 (47.34 – 54.62)	53.46 (49.18 – 57.74)	54.46 (50.15 – 58.77)
Female	46.36 (43.07 – 49.66)	49.01 (45.37 – 52.65)	46.53 (42.25 – 50.81)	45.53 (41.22 – 49.84)
Age (at recruitment)				
18 – 24	8.84 (6.29 – 11.39)	13.21 (9.45 – 16.96)	11.32 (8.09 – 14.55)	10.50 (6.93 – 14.08)
25 – 39	32.98 (29.60 – 36.35)	32.80 (29.21 – 36.39)	35.95 (31.43 – 40.48)	31.46 (26.57 – 36.35)
40 – 54	36.55 (33.50 – 39.60)	30.95 (28.02 – 33.87)	34.79 (31.02 – 38.56)	35.37 (31.60 – 39.14)
55 and older	21.61 (19.29 – 23.94)	23.02 (20.60 – 25.45)	17.91 (15.18 – 20.64)	22.65 (19.95 – 25.35)
Marital Status				
Married	62.80 (59.60 – 66.00)	52.38 (48.71 – 56.05)	59.77 (55.57 – 63.96)	54.75 (50.24 – 59.25)
Separated/Divorced	11.36 (9.64 – 13.08)	16.13 (13.96 – 18.30)	15.79 (12.98 – 18.59)	15.63 (12.84 – 18.41)
Widowed	4.02 (3.01 – 5.03)	4.77 (3.72 – 5.81)	2.32 (1.39 – 3.25)	5.85 (4.27 – 7.43)
Single	21.80 (18.84 – 24.75)	26.70 (22.95 – 30.45)	22.11 (18.40 – 25.82)	23.76 (19.19 – 28.33)
Ethnicity				
White, English only	91.14 (89.10 – 93.17)	94.76 (92.94 – 96.59)	90.73 (88.32 – 93.15)	83.22 (80.26 – 86.19)
Non-White, non-English	8.85 (6.82 – 10.89)	5.23 (3.40 – 7.05)	9.26 (6.84 – 11.67)	16.77 (13.80 – 19.73)
Income				
Low	18.48 (16.07 – 20.88)	25.89 (22.92 – 28.87)	22.46 (18.91 – 26.00)	29.96 (26.16 – 33.75)
Moderate	37.04 (33.76 – 40.31)	30.55 (27.29 – 33.81)	29.38 (25.44 – 33.33)	31.37 (27.30 – 35.44)
High	37.66 (34.39 – 40.94)	34.84 (31.14 – 38.55)	41.99 (37.67 – 46.31)	31.52 (27.07 – 35.97)
Unknown	6.80 (5.28 – 8.33)	8.70 (6.78 – 10.61)	6.15 (4.29 – 8.01)	7.13 (4.95 – 9.31)
Education				
Low	40.86 (37.57 – 44.14)	54.92 (51.25 – 58.58)	60.13 (55.80 – 64.46)	39.20 (34.99 – 43.40)
Moderate	38.86 (35.59 – 42.12)	26.07 (22.92 – 29.22)	25.13 (21.10 – 29.15)	37.32 (33.01 – 41.63)
High	20.27 (17.54 – 23.00)	19.00 (15.93 – 22.07)	14.73 (11.74 – 17.71+)	23.47 (19.35 – 27.60)
Smoking Status (at recruitment)				
Daily Smoker	93.45 (91.68 – 95.22)	94.75 (93.19 – 96.31)	90.26 (87.51 – 93.01)	92.47 (90.02 – 94.91)
Non-daily smoker	6.54 (4.77 – 8.31)	5.24 (3.68 – 6.80)	9.73 (6.98 – 12.48)	7.52 (5.08 – 9.97)
Smoking Status (at Wave 7)				
Current smoker	90.22 (88.11 – 92.32)	90.99 (88.82 – 93.17)	89.75 (87.06 – 92.45)	91.13 (88.52 – 93.74)
Former smoker	9.77 (7.67 – 11.88)	9.00 (6.82 – 11.17)	10.24 (7.54 – 12.93)	8.86 (6.25 – 11.47)
Exposure to price promotions				
Exposed at either Wave 7 or Wave 8	23.14 (20.21 – 26.06)	25.02 (21.83 – 28.22)	17.97 (14.87 – 21.07)	31.66 (27.39 – 35.94)
Exposed at Waves 7 and 8	8.83 (6.92 – 10.73)	15.73 (13.02 – 18.45)	11.13 (7.92 – 14.33)	54.47 (50.03 – 58.91)
Not exposed at either Wave 7 or 8	68.02 (64.83 – 71.21)	59.23 (55.61 – 62.84)	70.89 (66.88 – 74.90)	13.85 (11.24 – 16.46)

N = 4,698.

Missing values for all sample characteristics were under 0.5% (ranging from *n* = 0 for gender, age, and smoking status at recruitment to *n* = 22 for exposure to price promotions) except for smoking status at Wave 7 (*n* = 477, 10.1%). Participants who failed to report their smoking status at Wave 7 were treated as missing.

Table 2. Exposure to price promotions by country.

Exposure to price promotions	Canada (n = 1374)	United Kingdom (n = 1325)	Australia (n = 855)	United States (n = 1144)
	AOR 95%CI	AOR 95%CI	AOR 95%CI	AOR 95%CI
Exposed at Waves 7 and 8 (vs. no exposure)	1.00	1.94 (1.37 – 2.75)*	1.20 (0.77 – 1.85)	41.14 (28.23 – 59.96)*
Exposed at either Wave 7 or Wave 8 (vs. no exposure)	1.00	1.19 (0.90 – 1.57)	0.69 (0.51 – 0.95)*	7.26 (5.23 – 10.09)*

AOR: Adjusted odds ratio

95%CI: 95% Confidence intervals

* $p < 0.05$

Adjusted for age (reference 18-24), gender (reference: male), ethnicity (reference: White, English only), income (reference: high), education (reference: high), marital status (reference: single), survey mode at Waves 7 and 8 (reference: telephone, English), wave of recruitment (reference: Wave 1 recruits), and smoking status at Wave 7 (reference: daily smoker).

Table 3: Multivariate logistic regression of prospective associations between exposure to price promotions at Waves 7 and 8 and smoking-related beliefs and smoking status at Wave 8 among current and former smokers by country.

Outcome variables at Wave 8	Canada (<i>n</i> = 1374)	United Kingdom (<i>n</i> = 1325)	Australia (<i>n</i> = 855)	United States (<i>n</i> = 1144)	Country x Exposure
	AOR 95% CI	AOR 95% CI	AOR 95% CI	AOR 95% CI	<i>F, p</i>
Norms					
Society disapproves (social norms)					
At W7 and W8 (vs. no exposure)	1.38 (0.57 – 3.34)	0.75 (0.43 – 1.29)	2.06 (0.91 – 4.65)	0.82 (0.39 – 1.75)	1.28, 0.26
At either W7 or W8 (vs. no exposure)	1.39 (0.81 – 2.40)	1.87 (1.08 – 3.21)*	1.76 (0.90 – 3.44)	1.05 (0.47 – 2.37)	
People think you should not smoke (injunctive norms)					
At W7 and W8 (vs. no exposure)	0.89 (0.40 – 1.97)	0.66 (0.32 – 1.35)	0.76 (0.28 – 2.05)	1.84 (0.76 – 4.48)	0.50, 0.80
At either W7 or W8 (vs. no exposure)	1.38 (0.73 – 2.60)	0.95 (0.57 – 1.58)	1.61 (0.64 – 4.05)	1.36 (0.55 – 3.34)	
Functional value of smoking					
Calms down when stressed					
At W7 and W8 (vs. no exposure)	1.87 (0.94 – 3.73)	1.31 (0.75 – 2.30)	1.03 (0.43 – 2.46)	2.02 (1.04 – 3.95)*	0.55, 0.76
At either W7 or W8 (vs. no exposure)	1.30 (0.79 – 2.12)	0.98 (0.60 – 1.60)	1.66 (0.88 – 3.14)	1.26 (0.65 – 2.45)	
Important part of life					
At W7 and W8 (vs. no exposure)	0.93 (0.53 – 1.65)	0.78 (0.48 – 1.27)	0.87 (0.44 – 1.74)	0.65 (0.35 – 1.20)	1.47, 0.18
At either W7 or W8 (vs. no exposure)	0.73 (0.48 – 1.10)	0.92 (0.62 – 1.36)	1.23 (0.73 – 2.09)	1.32 (0.70 – 2.47)	
Enjoy smoking					
At W7 and W8 (vs. no exposure)	1.80 (0.76 – 4.26)	1.25 (0.63 – 2.50)	0.88 (0.34 – 2.26)	1.30 (0.54 – 3.15)	0.49, 0.81
At either W7 or W8 (vs. no exposure)	1.44 (0.84 – 2.47)	1.07 (0.61 – 1.89)	1.24 (0.62 – 2.50)	1.24 (0.50 – 3.03)	
Misconceptions around smoking					
Lighter taste means less tar					
At W7 and W8 (vs. no exposure)	0.89 (0.41 – 1.91)	0.49 (0.30 – 0.80)*	0.97 (0.41 – 2.30)	0.53 (0.22 – 1.23)	0.88, 0.50
At either W7 or W8 (vs. no exposure)	1.34 (0.81 – 2.21)	0.96 (0.58 – 1.59)	1.10 (0.47 – 2.57)	1.34 (0.56 – 3.19)	
Harsher smoke is more dangerous					
At W7 and W8 (vs. no exposure)	0.76 (0.41 – 1.41)	0.53 (0.32 – 0.88)*	0.74 (0.36 – 1.50)	1.20 (0.66 – 2.18)	1.81, 0.09
At either W7 or W8 (vs. no exposure)	1.26 (0.82 – 1.94)	0.69 (0.43 – 1.09)	1.00 (0.57 – 1.74)	1.82 (0.96 – 3.46)	
Tobacco industry and its regulations					
Tobacco industry more tightly regulated					
At W7 and W8 (vs. no exposure)	1.67 (0.88 – 3.16)	1.08 (0.66 – 1.79)	1.54 (0.74 – 3.17)	0.99 (0.58 – 1.69)	0.30, 0.93
At either W7 or W8 (vs. no exposure)	1.20 (0.79 – 1.81)	0.86 (0.53 – 1.41)	1.33 (0.79 – 2.22)	1.11 (0.64 – 1.90)	
Tobacco industry allowed no promotion for cigs					
At W7 and W8 (vs. no exposure)	1.10 (0.56 – 2.16)	0.99 (0.56 – 1.74)	2.44 (0.96 – 6.17)	1.06 (0.61 – 1.86)	0.38, 0.88
At either W7 or W8 (vs. no exposure)	1.98 (1.19 – 3.30)*	1.28 (0.75 – 2.18)	2.20 (1.06 – 4.55)*	1.22 (0.68 – 2.19)	
Tobacco plain packages for cigs					
At W7 and W8 (vs. no exposure)	1.14 (0.65 – 1.98)	0.91 (0.53 – 1.56)	0.90 (0.43 – 1.85)	0.94 (0.50 – 1.77)	0.13, 0.99
At either W7 or W8 (vs. no exposure)	0.91 (0.59 – 1.42)	0.83 (0.56 – 1.23)	1.18 (0.68 – 2.04)	1.11 (0.58 – 2.11)	
Tobacco industry sincerely improve health of customers					
At W7 and W8 (vs. no exposure)	1.05 (0.56 – 1.96)	1.03 (0.60 – 1.76)	0.40 (0.16 – 0.99)*	1.10 (0.65 – 1.86)	0.47, 0.83
At either W7 or W8 (vs. no exposure)	0.96 (0.61 – 1.49)	0.90 (0.56 – 1.45)	0.61 (0.34 – 1.10)	1.05 (0.61 – 1.80)	

Sue tobacco companies to recover health care costs					
At W7 and W8 (vs. no exposure)	1.14 (0.62 – 2.10)	0.92 (0.59 – 1.46)	0.68 (0.27 – 1.70)	1.25 (0.68 – 2.29)	0.45, 0.84
At either W7 or W8 (vs. no exposure)	1.20 (0.77 – 1.89)	1.19 (0.76 – 1.86)	1.09 (0.65 – 1.83)	1.00 (0.54 – 1.83)	
Smoking behavior (being a current smoker at Wave 8)					
At W7 and W8 (vs. no exposure)	1.20 (0.48 – 3.00)	1.57 (0.76 – 3.21)	2.09 (0.88 – 4.95)	1.50 (0.62 – 3.65)	0.18, 0.98
At either W7 or W8 (vs. no exposure)	1.22 (0.64 – 2.34)	1.10 (0.63 – 1.91)	1.67 (0.76 – 3.67)	1.07 (0.43 – 2.67)	

AOR: Adjusted odds ratio

95%CI: 95% Confidence intervals

* $p < 0.05$

Adjusted for age (reference: 18-24), gender (reference: male), ethnicity (reference: White, English only), income (reference: high), education (reference: high), marital status (reference: single), survey mode at Waves 7 and 8 (reference: telephone, English), wave of recruitment (reference: Wave 1 recruits), and smoking status at Wave 7 (reference: daily smoker). All belief statements were adjusted for belief at wave 7 except for “tobacco industry sincerely improve health of customers” because no measure was available at wave 7.

Table 4. Multivariate logistic regression of prospective associations between exposure to price promotions at Waves 7 and 8 and smoking-related beliefs and smoking status at Wave 8 among current and former smokers by price-promotions ban status.

Outcome variables at Wave 8	Ban countries (Canada, United Kingdom; <i>n</i> = 2699)	No-ban countries (Australia, United States, <i>n</i> = 1999)
	AOR 95%CI	AOR 95%CI
Norms		
Society disapproves (social norms)		
At W7 and W8 (vs. no exposure)	0.82 (0.51 – 1.30)	1.10 (0.74 – 1.64)
At either W7 or W8 (vs. no exposure)	1.45 (0.99 – 2.12)	1.46 (0.93 – 2.31)
People think you should not smoke (injunctive norms)		
At W7 and W8 (vs. no exposure)	0.74 (0.43 – 1.27)	1.71 (1.03 – 2.83)*
At either W7 or W8 (vs. no exposure)	1.10 (0.75 – 1.63)	1.51 (0.90 – 2.51)
Functional value of smoking		
Calms down when stressed		
At W7 and W8 (vs. no exposure)	1.51 (0.96 – 2.35)	1.83 (1.16 – 2.89)*
At either W7 or W8 (vs. no exposure)	1.09 (0.77 – 1.55)	1.35 (0.89 – 2.05)
Important part of life		
At W7 and W8 (vs. no exposure)	0.82 (0.56 – 1.19)	0.80 (0.56 – 1.15)
At either W7 or W8 (vs. no exposure)	0.81 (0.61 – 1.07)	1.47 (1.03 – 2.09)*
Enjoy smoking		
At W7 and W8 (vs. no exposure)	1.40 (0.83 – 2.36)	1.22 (0.74 – 1.99)
At either W7 or W8 (vs. no exposure)	1.21 (0.82 – 1.78)	1.16 (0.72 – 1.86)
Misconceptions around smoking		
Lighter taste means less tar		
At W7 and W8 (vs. no exposure)	0.64 (0.42 – 0.97)*	0.77 (0.49 – 1.22)
At either W7 or W8 (vs. no exposure)	1.11 (0.78 – 1.57)	1.43 (0.87 – 2.34)
Harsher smoke is more dangerous		
At W7 and W8 (vs. no exposure)	0.65 (0.45 – 0.95)*	1.05 (0.74 – 1.51)
At either W7 or W8 (vs. no exposure)	0.93 (0.67 – 1.27)	1.29 (0.87 – 1.92)
Tobacco industry and its regulations		
Tobacco industry more tightly regulated		
At W7 and W8 (vs. no exposure)	1.37 (0.92 – 2.04)	1.05 (0.73 – 1.51)
At either W7 or W8 (vs. no exposure)	1.03 (0.75 – 1.42)	1.13 (0.79 – 1.63)
Tobacco industry allowed no promotion for cigs		
At W7 and W8 (vs. no exposure)	1.06 (0.69 – 1.64)	0.69 (0.47 – 1.01)
At either W7 or W8 (vs. no exposure)	1.61 (1.11 – 2.34)*	0.92 (0.63 – 1.34)
Tobacco plain packages for cigs		
At W7 and W8 (vs. no exposure)	1.00 (0.67 – 1.48)	0.80 (0.56 – 1.15)
At either W7 or W8 (vs. no exposure)	0.88 (0.66 – 1.19)	0.94 (0.65 – 1.35)
Tobacco industry sincerely improve health of customers		
At W7 and W8 (vs. no exposure)	1.00 (0.66 – 1.52)	1.22 (0.85 – 1.76)
At either W7 or W8 (vs. no exposure)	0.95 (0.69 – 1.30)	1.10 (0.78 – 1.55)
Sue tobacco companies to recover health care costs		
At W7 and W8 (vs. no exposure)	1.01 (0.69 – 1.46)	0.84 (0.57 – 1.23)
At either W7 or W8 (vs. no exposure)	1.20 (0.88 – 1.65)	0.80 (0.57 – 1.13)
Smoking behavior (being a current smoker at Wave 8)		
At W7 and W8 (vs. no exposure)	1.30 (0.76 – 2.24)	1.94 (1.12 – 3.39)*
At either W7 or W8 (vs. no exposure)	1.18 (0.77 – 1.81)	1.34 (0.81 – 2.22)

AOR: Adjusted odds ratio

95%CI: 95% Confidence intervals

* $p < 0.05$

Adjusted for age (reference: 18-24), gender (reference: male), ethnicity (reference: White, English only), income (reference: high), education (reference: high), marital status (reference: single), survey mode at Waves 7 and 8 (reference: telephone, English), wave of recruitment (reference: Wave 1 recruits), and smoking status at Wave 7 (reference: daily smoker). All belief statements were adjusted for belief at wave 7 except for “tobacco industry sincerely improve health of customers” because no measure was available at wave 7.

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